

Insulation Improves Economic Returns in Manufacturing

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If purchased fuel is the “currency” of an industrial plant’s energy budget, then mechanical insulation is one of its “savings” components. Just as savings have a specific place in a financial plan for creating wealth, so does insulation play a role in optimizing a plant’s valuable energy resources.

According to the U.S. Department of Energy’s BestPractices Steam program, mechanical insulation should be used on any surface over 120°F. Boiler surfaces, distribution mains, condensate return pipes and vessels, and hardware fittings should all be properly insulated to conserve thermal resources. Two tip sheets, part of a series of BestPractices Steam tip sheets that currently numbers 19, discuss the benefits of mechanical insulation and demonstrate the calculation of energy savings that it provides (see sidebar).

The value proposition is not the steam itself, but the heat that steam provides. Steam can efficiently and safely dispatch thermal resources from the boiler to multiple locations within a plant, usually to locations appreciably distant from the steam source. Plant managers depend on insulation not only to conserve thermal resources throughout a steam system, but to enhance process stability, ensure personnel safety and to attenuate noise.

Two prime considerations are “whether the insulation is dry and snugly fitted, and whether there is enough of it,” suggests Don Wulfinhoff, author of the *Energy Efficiency Manual*. Moisture drastically reduces the heat retention capabilities of insulation. But if the insulation system (insulation and protective jacketing) is properly specified and installed for the steam application, moisture penetration will be reduced and the insulation system will remain effective indefinitely.

The performance of the insulation system is maximized when the correct thickness is specified for the application. Energy savings justify insulation up to a certain thickness, beyond which any additional economic or energy savings may not be worth the cost. (See sidebar discussion.)

Sidebar Discussion

BestPractices Steam, a U.S. DOE initiative, generates references, diagnostic software, case studies, and industry outreach events for the benefit of the industrial steam community. A series of 19 steam tip sheets is available. Each is one page, providing an overview of a steam improvement opportunity and an example for calculating its economic impact.

Two steam tip sheets are devoted to insulation use: (1) *Insulate Steam Distribution and Condensate Return Lines* and (2) *Install Removable Insulation on Uninsulated Valves and Fittings*.

Determining the appropriate thickness for a given mechanical component is addressed by 3E Plus®, a free software tool developed by the North American Insulation Manufacturers Association, and distributed by BestPractices Steam.

An insulation energy appraisal performed by a certified insulation energy appraiser can provide an energy user with a comprehensive assessment of the piping and equipment in a facility and provide recommendations that will help save energy, and reduce fuel costs and greenhouse emissions. The DOE has embraced the insulation energy appraisal certification training program available from the National Insulation Association.

See www.insulation.org.

Readers are encouraged to visit the BestPractices website at www.oit.doe.gov/bestpractices.

Steam tip sheets and most other resources are free of charge and may be downloaded from www.steamingahead.org/resources.htm or may be requested from the BestPractices Clearinghouse: (800) 862-2086 or clearinghouse@ee.doe.gov.

Potential savings from insulation application and upgrades may reduce fuel consumption anywhere from 3 to 13 percent, according to the U.S. DOE's Industrial Assessment Center program. Results are sometimes dramatic: a Georgia-Pacific plywood plant in Madison, Georgia upgraded the insulation on steam lines to its dryers. This allowed the plant to reduce its steam load by 6,000 pounds per hour and cut its fuel bill. The investment paid for itself in six months.

A recent insulation energy appraisal was performed on a chemical plant in Kentucky. They had a nagging maintenance issue, and over the past five years had discussed and re-discussed the cost and value of fixing and upgrading the insulation on their distribution lines. A \$300,000 investment in insulation upgrades yielded a \$700,000 savings in fuel costs. Payback for the investment: three years. An added benefit was reduced emissions. (See sidebar discussion on previous page).

By conserving thermal resources, insulation not only saves money but also improves plant productivity. In this sense, insulation *makes* money for the plant. In addition, the expense relief that it provides becomes a new source of cash that can be applied to other processes in the plant, or to marketing and administration. All of these benefits make insulation a priority for manufacturers in a competitive marketplace.